

# NASA TECH BRIEF

## NASA Pasadena Office

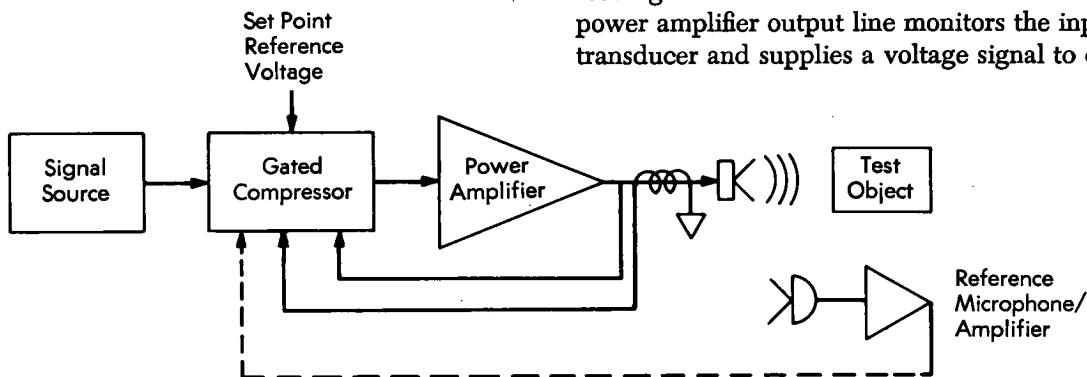


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### Gated Compressor, Distortionless Signal Limiter

Qualification testing of hardware for response to high-intensity acoustic energy is primarily performed in a reverberant chamber powered by an electro-pneumatic transducer; a stream of air or nitrogen

The overall test system shown in the block diagram consists of a signal source which produces the frequency spectrum required for the acoustic test, a gated compressor circuit, and a power amplifier feeding the transducer. A current transformer in the power amplifier output line monitors the input to the transducer and supplies a voltage signal to one input



passing through the throat of the transducer is modulated by a valve arrangement which, in turn, is driven by a signal generator/amplifier arrangement which produces a prescribed frequency spectrum.

A typical voice coil can be damaged when excitation exceeds a level of about six amperes, but excessive currents can be prevented by use of signal clippers and compressors. However, although clippers eliminate peaks, they introduce distortion and do not limit power input sufficiently; compressors introduce unacceptable distortion by their asymmetrical action. A comparator/multiplier arrangement has been developed to eliminate these drawbacks; the arrangement is capable of limiting input power to the voice coil so that the desired maximum current level is never exceeded.

of the gated compressor to prevent the current fed to the voice coil from exceeding six amperes. However, since the voice coil is inductive and the excitation signal is AC, it is possible to exceed either the current rating or the maximum voltage limit for the voice coil; therefore, the voltage supplied by the power amplifier is also monitored. A set-point reference voltage which corresponds to the maximum permissible current and voltage input to the voice coil of the transducer is also fed to the compressor. A signal from a microphone/amplifier as indicated in the diagram may also be used to monitor maximum sound pressure in the chamber so as to prevent exceeding a desired acoustic limit. The gated compressor is actuated only when any of the input channels exceeds the reference voltage.

(continued overleaf)

The gated compressor uses an OR gate back-biased by the reference voltage to control the gain of a multiplier. The signal derived from a desired parameter such as voice coil current, voltage or sound field level (or any combination) is compared with the reference voltage; when any control signal exceeds the reference level, the multiplier output decreases in proportion to increasing error signal so that the power amplifier output remains at a constant level.

**Note:**

Requests for further information may be directed to:

Technology Utilization Officer  
NASA Pasadena Office  
4800 Oak Grove Drive  
Pasadena, California 91103  
Reference: TSP 73-10387

**Patent status:**

NASA has decided not to apply for a patent.

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